INTERNATIONAL ANATOLIA ACADEMIC ONLINE JOURNAL

e-ISSN 2148-3159 HEALTH SCIENCES RESEARCH ARTICLE

THE EFFECT of PENIL LENGTH TO THE SURGICAL RESULTS OF HYPOSPADIAS REPAIRED USING THE SNODGRASS TECHNIQUE

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Geliş Tarihi/Received	Kabul Tarihi/Accepted	Yayın Tarihi/Published
01.07.2021	28.07.2021	30.08.2021

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**** Bu çalışma, ilk yazarın uzmanlık tezinden türetilmiştir.***

ÖZET

Giriş

Bu çalışmada hipospadias tanısı konulan ve tubularize insize üretroplasti (TIPU) tekniği ile ameliyat edilen hastalarda, üroflowmetri kullanılarak ölçülen postoperatif komplikasyonlar, kozmetik durum ve üretral fonksiyonlardeğerlendirildi.

Yöntem

Ocak 2008-Kasım 2011 tarihleri arasında hipospadias tanısı alan ve TIPU işlemi uygulanan 174 hastanın retrospektif analizi yapıldı. Hastalar hipospadias tipi, tanı ve ameliyat yaşı, ameliyat sonrası erken komplikasyonlar, idrara çıkma şekli, kontrol grubu ile karşılaştırıldı. Kordi, penis uzunluğu ve üretral meatus çapının varlığı, ayrıca penis başının şekli ve cildin görünümü değerlendirildi.

Bulgular

TIPU yöntemi ile hipospadias cerrahisi sonrası erken komplikasyon oranı %11.8 idi. Hasta ve kontrol gruplarının üroflovmetrik değerlendirmesinde yaş, maksimum akış hızı, hacim, idrara çıkma süresi veya ortalama akış hızında herhangi bir farklılık tespit edilmedi. Kontrol grubunda ortalama penis uzunluğu (6,42 : 5,94) ve dış mera çapı (10,13 : 9,87) daha uzun olmasına rağmen istatistiksel olarak anlamlı bulunmadı ($p>0,05$). Ancak hasta grubunun (22.87 ± 15.09 ml/sn.) kontrol grubuna (15.03 ± 9.48) göre anlamlı olarak daha uzun bir akış süresi vardı ($p = 0.019$) ve nomogram tiplerinin değerlendirilmesi, plato paterni daha fazla olduğunu gösterdi. hasta grubunda (çan eğrisi %40.0 / plato %60,0) kontrol grubuna göre (çan eğrisi %83,3 / plato %16,7) yaygındır. Hastaların kozmetik değerlendirmesi, penis uzunluğu ve meatus çapına göre persentil dağılımı kullanılarak yapıldı. İki grup arasında anlamlı bir fark bulunamadı.

Tartışma

TIPU prosedürü, düşük komplikasyon oranı ve yüksek kozmetik sonuçlar ile ilişkilidir. Sonuç olarak, istatistiksel anlamlılık olmamasına rağmen, penis uzunluğu ve çapı kontrol grubuna göre daha kısaydı ve neo-üretranın işeme paterninde ve akışında negatif değişiklikler vardı. Üroflovmetri sonucunda , ameliyat edilen hastalarda obstrüktif paternde bir üretral akış saptansa da , çoğu hastada bu durum tedavi gerektirmez.

ABSTRACT

Introduction

This study evaluated the postoperative complications, cosmetic state, and urethral functions measured using uroflowmetry in patients diagnosed with hypospadias who underwent surgery via the tubularized incised urethroplasty (TIPU).

Method

Retrospective analyses were conducted of 174 patients who were diagnosed with hypospadias and underwent the TIPU procedure from January 2008 to November 2011. Patients were compared to a control group in consideration of hypospadias type, age at diagnosis and operation, early postoperative complications, urination pattern, presence of chordee, penile length, and urethral meatus diameter. In addition, the shape of the glans and appearance of the skin were assessed.

Discussion

The early complication rate following hypospadias surgery via the TIPU method was 11.8%. Uroflowmetric assessment of the patient and control groups identified no differences in age, maximum flow rate, volume, urination time, or average flow rate. Although the mean penile length (6,42 : 5,94) and external mea diameter (10,13 : 9,87) were longer in the control group, no statistical significance was found ($p>0,05$). However, there was a significantly longer flow time of the patient group (22.87 ± 15.09 ml/sec.) than that of the control group (15.03 ± 9.48) ($p = 0.019$) and assessment of nomogram types indicated that the plateau pattern were more common in the patient group (bell curve 40.0% / plateau 60.0%) than the control group (bell curve 83.3% / plateau 16.7%) respectively. Cosmetic assessment of patients was performed using the percentile distribution according to penile length and meatus diameter. No significant differences were found between the two groups..

The TIPU procedure is associated with a low complication rate and high cosmetic results. Although there was no statistical significance, the penile length and diameter were shorter than the control group and the neo-urethra had negative changes in voiding pattern and flow. Although uroflowmetry indicated obstructed urethral flow, this does not require treatment in most patients.

INTRODUCTION

Hypospadias is a ventral penis abnormality arising from the incomplete development of the anterior urethra. The frequency of this abnormality is 1:300 regardless of the localization of the urethral meatus (1). Because the anatomy of the urethral meatus, glans, and penis may vary, there is no defined operative method for the treatment of hypospadias. Instead, it is more useful to discuss the methods expected to provide the best results based on the type of deformity, rather than the most successful surgical method (2). Hypospadias repair using the Snodgrass procedure, also known as tubularized incised plate urethroplasty (TIPU) became popular during the 1990s and is now the most preferred treatment method. Compared to other procedures, this repair technique is associated with considerably fewer complications, including bleeding, meatal stenosis, urethrocutaneous fistula, pseudodiverticulum, and urethral stricture (3).

Although there are a large number of studies on the TIPU technique, relatively few studies have measured penil length, urethral function and assessed the cosmetic result in same study. Moreover, most of them have focussed on adult populations (4,5).

METHOD

Retrospective analyses were conducted of patients diagnosed with hypospadias and who underwent surgery via the Snodgrass technique. All operations were performed by the same surgeon.

Postoperative complications, uroflowmetric measures, penile length, and meatus diameter of the patients were recorded. A control group, comprising randomly selected children with no urological problems, was used for statistical comparison. A $p < 0.05$ was taken to indicate significance.

Patients older than 6 months were included in the postoperative follow-up, while the uroflowmetric assessment included patients older than 4.5 years who had completed their toilet training.

Before starting any procedure, the families of children in the patient and control groups were informed and were asked to sign information and consent forms. Then approval was obtained from the local ethics committee.

RESULTS

Retrospective analyses were performed on 174 patients who were diagnosed with hypospadias. Ninety-four patients underwent surgery using the TIPU technique. Figure 1 shows the distribution of hypospadias types of the operated patients according to Barcat classification (6,7).

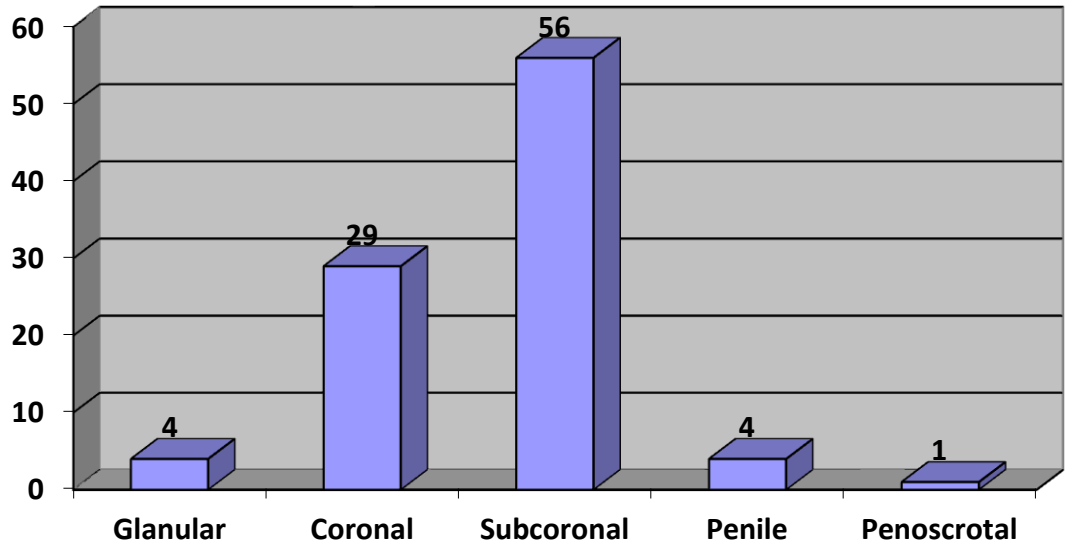

Figure 1. Hypospadias types.

The patients' average age at diagnosis was 3.75 years (range, 2 months to 14.4 years) and the average operation age was 4.1 years (range, 6 months to 16.6 years). In all, 26 patients had chordee (27.65%); the curvature was repaired by the Baskin method in 18 (69.2%) and by the Nesbit method in 8.

Follow-up revealed complications such as fistula development in 5 (8.4%) patients and glans dehiscence in 2 (3.4%).

For objective cosmetic assessment of each group, penile lengths and urethral meatus diameters were measured (Table 1).

Tablo 1. Mean values of control and patients group penis length percentile

		Control Group	Patient Group	p
		Average±sd	Average±sd	
	Penile length(cm)	6,42±1,13	5,94±0,81	0,063
	Diameter of meatus	10,13±1,57	9,87±1,28	0,544

t test /Mann-whitney u test %95 confidence interval

Although the mean penile length (6,42 : 5,94) and external mea diameter (10,13 : 9,87) were longer in the control group, no statistical significance was found (p>0,05) (Table 2).

Table 2. Average penile length percentile

		Control Group		Patient Group		p
		n	%	n	%	
Percentiles(%)	10	0	0,0	5	16,7	0,055
	10-90	22	73,3	20	66,7	
	90	8	26,7	5	16,7	

Chi-square test %95 confidence interval

Uroflowmetry was applied to 30 patients and 30 controls. No differences were detected in age, maximum flow rate, urinated volume, urination time, and average flow rate between the two groups ($p > 0.05$). However, the flow time of the patient group (22.87 ± 15.09 ml/sec.) was significantly greater than that of the control group (15.03 ± 9.48) ($p = 0.019$) (Table 3).

Table 3. Average uroflowmetry parameters in the control and patient groups

	Control Group Average ± s. s.	Patient Group Average ± s. s.
Age	7,28 ± 2,70	7,61 ± 2,66
Maximum flow rate (ml/sec)	22,60 ± 11,80	18,50 ± 8,10
Urine volume (ml)	197,33 ± 105,90	230,40 ± 111,04
Flow time (sec)	15,03 ± 9,48	22,87 ± 15,09
Time to void (sec)	24,00 ± 14,05	25,30 ± 15,05
Average flow rate (ml/sec)	12,07 ± 6,03	12,03 ± 5,78

t test / Mann - whitney u test %95 confidence interval

Nomogram types significantly differed between patients and controls ($p = 0.001$). The bell curve nomogram type was more common in the control group (bell curve 83.3%/plateau 16.7%) while the plateau type was more common in the patient group (bell curve 40.0%/plateau 60.0%) (Table 4).

Table 4. Average of the nomogram type in the patient and control groups

		Control Group		Patient Group		p
		n	%	n	%	
Nomogram Type	Bell Curve	25	83,3%	12	40,0%	0,001
	Plateau Curve	5	16,7%	18	60,0%	

Chi-square test %95 confidence interval

DISCUSSION

The TIPU technique was first defined by Warren Snodgrass in 1994. This technique was said to be particularly applicable to hypospadias cases (8,9). It is now the most frequently used technique in the repair of distal hypospadias.

Complications that may occur following hypospadias repair with the TIPU technique (bleeding, meatal stenosis, urethrocutaneous fistula, pseudodiverticulum, urethral stricture) are uncommon (10). Urethrocutaneous fistula is the most frequent (4–25%) complication following hypospadias surgery (11), and thus the fistula rate is the primary criterion for assessing the success of the operation. Some previous studies have concluded that the incidence of fistula in the TIPU technique is lower than that in other techniques (12,13).

The objective of the TIPU procedure is the formation of a functional urethra. Information on the functionality of the urethra is an indicator of the success of the surgical technique (14). Uroflowmetry is one of the most useful methods for gaining information on the dynamics of the lower urinary system. In addition, it is commonly used due to its noninvasive nature, ease of application, low cost, and absence of any known apparent side effects (15).

According to the uroflowmetry results from the patients in our study, the maximum flow rate, urinated volume, urination time, and average flow rate were not significantly different between the groups. This indicates that the new urethra is functionally normal following TIPU. The only significant difference between the groups was observed in the nomogram types. In our patient group, 8 out of 30 patients (60%) had a plateau pattern of urination while 83% of the control group showed a bell curve pattern of urination. These results are

in line with some previous studies that reported that the plateau pattern of urination is more frequent following this type of surgery (16, 17). This is attributed to the inadequate presence of spongious supporting tissue. As we demonstrated in our study, the reason could be that the penile length and mea diameters of children coming to hypospadias surgery were evaluated shorter than the control group. However, normal patients may also urinate in a plateau pattern (17). Indeed, the plateau-type monogram curve was observed in 16.7% of our control group.

Uroflowmetry has been used to diagnosis patients suspected of obstruction and particularly stricture. Garibay *et al*. (l8) emphasised the importance of uroflowmetry following hypospadias repair. In that study, 30% of patients that had an obstruction showed symptoms while only 2 patients required stricture repair. In simultaneous uroflowmetry studies, 5% of non-operated patients had plateau-type nomogram curves and were asymptomatic. This demonstrates that the plateau pattern of urination does not always indicate obstruction if the patient does not have any symptoms. In Snodgrass *et al*. (19), uroflowmetry was applied to 17 patients aged 6 months to 7 years who underwent the TIUP procedure; 16 cases had normal flow rates while 1 case had a low flow rate despite a normal nomogram. In our study, 60% of patients in our patient group had a plateau-type flow curve and showed no statistical difference in their flow rates according to age; these patients were generally comparable to those in the control group, and no urination problems were observed in them. This demonstrates that the low flow rate detected following hypospadias repair using the TIPU technique is not an indicator of obstruction (20). In Hout *et al*. (21), uroflowmetry was applied to patients at 6-month intervals following surgery to compare the urinary flow rate of the patients. They assessed the preoperative localization of the urethral meatus, operation age, follow-up period, maximum urinary flow rate, urination volume, postvoiding residue, and nomogram types and found that the parameters positively changed with age. In our study, maximum uroflow was lower in patients with a plateau-shaped nomogram curve than in normal infants. The reason for this discrepancy could be that patients may have had a hypoplastic urethra with weak spongious tissue and meatal stenosis (22–23). Other known parameters of this condition include complications such as fibrosis and urethral stricture, which develop postoperatively as a result of the tension caused by the glanuloplasty. Wolffenbuttel *et al*. (24) reported that a reduced urinary flow rate following hypospadias surgery might be followed-up for more than 10 years without symptoms. In hypospadias patients, an obstructive urination pattern forms part of the disease and recovers during long-term follow-up.

Currently, a good cosmetic result is another factor determining the success of hypospadias surgery. A penile cosmetic scoring system (the Paediatric Penile Perception Score) is used to measure the postoperative cosmetic results. This system requires four parameters:

urethral meatus diameter, penile length, shape of the glans, and skin appearance (25, 26). We used only penile length and meatus diameter because they are objective criteria based on measurements. No differences were detected between the groups. The average penile length in both groups was between the 10^{th} and 90^{th} percentiles (Table 2). There were also no significant differences in meatus diameter between the groups. These results indicate a good cosmetic result.

No infections or ischaemic conditions developed in our patients. Sarhan *et al*. (27) used the TIPU technique in a study on 80 patients with an average age of 4.5 years and reported a complication rate of 13.8% (8 urethral fistula, 2 dehiscence, and 3 meatal stenosis). Snodgrass *et al*. (28), in a study on 16 cases, reported that they used postoperative catheterisation for 10 days and did not observe any complications. Bleustein *et al*. (29) proposed a healing mechanism following incision of the urethral plate in hypospadias surgery. They suggested that the healing occurs by re-epithelialisation with normal tissue ingrowth. By contrast, the sutured closure heals with a desmoplastic and inflammatory response. In our study, we did not observe complications such as meatal stenosis and urethral stricture. The suture technique is another important parameter related to complications. Concerning the suture technique in hypospadias surgery, Ulman *et al*. (30) compared 6/0 polyglactin, single-layer, full-thickness, continuous suture to 7/0 polydioxanone continuous suture and reported that the former might decrease the complication rate. Other studies have compared continuous and single sutures and have reported successful results (31) for both and no differences in complications (32).

In conclusion, TIPU is a procedure with an acceptably low complication rate and satisfying cosmetic results. Despite a postoperatively high rate of obstructive urination, reoperation is rarely required.

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